Research Seminar Supply Chain Management (OPM 701)

“Current Topics in Supply Chain Management Research”

General Information:

1. The goal of this seminar is to introduce the participants to the conducting of scientific research. It thereby prepares the students for the writing of their diploma / MSc thesis. The seminar is geared towards students intending to write their thesis at the Chair of Logistics.

2. Each Participant will explore one of the research papers listed below. The task is to review and critically assess the assigned research paper and to relate it to the corresponding stream of scientific literature. Each participant presents his/her findings in a written report (about 20 pages) as well as in an in-class presentation (20 min + 20min discussion).

3. Each participant also acts as a discussant for one of the other presentations. The discussant is responsible for critically assessing the presented work and for opening the ensuing discussion.

4. A kick-off meeting for all participants will be held on Wednesday, June 4, 11:00 hrs in Room SO 318. During this meeting, general guidelines for conducting a scientific literature review will be discussed.

5. The written reports have to be submitted electronically and as a hard copy in two-fold by November 7.

6. The presentations will be held as a blocked session (exact times + room to be announced). Attendance of the presentations is obligatory.

7. The final grade for the seminar is composed of the following components: Written report (60%), presentation (30%), contribution to discussion (10%).

8. The report and the presentations can be delivered either in English or in German.

9. There is a joint application process for all seminars offered by the chairs of the Area Operations Management. In the HWS 2014, this includes the following seminars:

   - OPM 701: Research Seminar Supply Chain Management (Chair of Logistics and Supply Chain Management), topics labeled with ‘L’
   - OPM 761: Research Seminar Production Management (Chair of Production Management), topics labeled with ‘P’
   - OPM 781: Research Seminar Service Operations (Chair of Service Operations), topics labeled with ‘S’
Detailed information on the seminar topics is available on the home pages of the respective chairs. In their application, students can indicate up to five preferred topics from all seminars.

10. Students can apply for the seminars by completing the following online form (click here). Applicants for OPM 701 must in addition send a CV + official grades overview by e-mail to logistik@bwl.uni-mannheim.de, mentioning “Seminar Application Documents” in the subject row.

11. Applications will be accepted until May 23. Admission to the seminar is binding and will be confirmed by e-mail by May 26.

12. For questions concerning the seminar, contact Prof. Fleischmann at logistik@bwl.uni-mannheim.de.

Seminar topics

Each participant will be assigned one of the topics listed below. The task then is to identify the main issues addressed by the paper, explain its methodology, including potential quantitative models, position it in the corresponding stream of scientific literature, and critically assesses the paper’s contribution to the literature as well as to practice.

This paper investigates the impacts inventory shortage policies have on transportation costs in base-stock distribution systems under uncertain demand. The model proposed demonstrates how backlogging arrangements can serve to decrease the variability of transportation capacity requirements, and hence the magnitude of transportation costs, when compared with policies that expedite demand shortages. The model shows how inventory policy decisions directly impact expected transportation costs and provides a new method for setting stock levels that jointly minimizes inventory and transportation costs. The model and solution method provide insights into the relationship between inventory decisions and transportation costs and can serve to support delivery policy negotiations between a supplier and customer that must choose between expediting and backlogging demand shortages.

Holding costs are traditionally determined from the investment in physical stock during a cycle. An alternative approach instead derives holding costs from Net Present Value (NPV) functions. It is known that applying both frameworks to the same system can lead to different holding cost valuations, but little explanation has been offered. By introducing the Anchor Point in a model, this paper shows, for four different systems, that traditional holding cost models
(implicitly) assume pull conditions, while current NPV approaches model push conditions. This explains in part the differences between the methods. It is shown that the Anchor Point concept allows the construction of NPV models under pull conditions, giving results in better correspondence with traditional models. The traditional framework is restricted to pull conditions and important considerations could be easily overlooked, leading to wrong valuations of holding costs. NPV seems superior as such considerations are automatically incorporated. The application to multi-echelon inventory systems provides interesting insights on the roles of echelon stocks and lead-times, and offers potential for future research.


Efficient and reliable home delivery is crucial for the economic success of online retailers. This is especially challenging for attended home deliveries in metropolitan areas where logistics service providers face congested traffic networks and customers expect deliveries in tight delivery time windows. Our goal is to develop and compare strategies that maximize the profits of a logistics service provider by accepting as many delivery requests as possible, while assessing the potential impact of a request on the service quality of a delivery tour. Several acceptance mechanisms are introduced, differing in the amount of travel time information that is considered in the decision of whether a delivery request can be accommodated or not. A real-world inspired simulation framework is used for comparison of acceptance mechanisms with regard to profits and service quality. Computational experiments utilizing this simulation framework investigate the effectiveness of acceptance mechanisms and help identify when more advanced travel time information may be worth the additional data collection and computational efforts.


We analyze the competitive capacity investment timing decisions of both established firms and start-ups entering new markets, which have a high degree of demand uncertainty. Firms may invest in capacity early (when uncertainty is high) or late (when uncertainty has been resolved), possibly at different costs. Established firms choose an investment timing and capacity level to maximize expected profits, whereas start-ups make those choices to maximize the probability of survival. When a start-up competes against an established firm, we find that when demand uncertainty is high and costs do not decline too severely over time, the start-up takes a leadership role and invests first in capacity, whereas the established firm follows; by contrast, when two established firms compete in an otherwise identical game, both firms invest late. We conclude that the threat of firm failure significantly impacts the dynamics of competition involving start-ups.

Several firms are interested in manufacturing and selling new products based on a new process technology. Before manufacturing can begin, either these Original Equipment Manufacturers (OEMs), or a Contract Manufacturer (CM) needs to adopt the process technology, i.e., make a capacity investment in it. Due to market uncertainty, the timing of capacity investment is crucial. In such a setting, we investigate how the timing of process adoption, an important determinant of time-to-market, is impacted by the make/buy decision. We first characterize the optimal time for process adoption and show that this delay depends on competitive intensity, cost structure and the rate of forecast improvement. Due to differing cost structures, incentives and risks, an OEM and a CM may invest in a new process technology at different times. We show that while there are conditions where outsourced manufacturing can be advantageous for the OEM from a time-to-market perspective, there are also cases where the OEM would be disadvantaged. In these cases, the OEM can accelerate process adoption by risk sharing through joint investment. Finally, the right choice of CM is extremely important for an OEM that faces a short time window for product introduction: An efficient CM not only provides low costs but also rapid access to new process technologies, and therefore higher revenues.


A popular assumption in the current literature on remanufacturing is that the whole new product is produced by an integrated manufacturer, which is inconsistent with most industries. In this paper, we model a decentralised closed-loop supply chain consisting of a key component supplier and a non-integrated manufacturer, and demonstrate that the interaction between these players significantly impacts the economic and environmental implications of remanufacturing. In our model, the non-integrated manufacturer can purchase new components from the supplier to produce new products, and remanufacture used components to produce remanufactured products. Thus, the non-integrated manufacturer is not only a buyer but also a rival to the supplier. In a steady state period, we analyse the performances of an integrated manufacturer and the decentralised supply chain. We find that, although the integrated manufacturer always benefits from remanufacturing, the remanufacturing opportunity may constitute a lose-lose situation to the supplier and the non-integrated manufacturer, making their profits be lower than in an identical supply chain without remanufacturing. In addition, the non-integrated manufacturer may be worse off with a lower remanufacturing cost or a larger return rate of used products due to the interaction with the supplier. We further demonstrate that the government-subsidised remanufacturing in the non-integrated (integrated) manufacturer is detrimental (beneficial) to the environment.

Carbon footprinting is a tool for firms to determine the total greenhouse gas (GHG) emissions associated with their supply chain or with a unit of final product or service. Carbon footprinting typically aims to identify where best to invest in emission reduction efforts, and/or to determine the proportion of total emissions that an individual firm is accountable for, whether financially and/or operationally. A major and underrecognized challenge in determining the appropriate allocation stems from the high degree to which GHG emissions are the result of joint efforts by multiple firms. We introduce a simple but general model of joint production of GHG emissions in general supply chains, decomposing the total footprint into processes, each of which can be influenced by any combination of firms. We analyze two main scenarios. In the first scenario, the social planner allocates emissions to individual firms and imposes a cost on them (such as a carbon tax) in proportion to the emissions allocated. In the second scenario, a carbon leader voluntarily agrees to offset all emissions in the entire supply chain and then contracts with individual firms to recoup (part of) the costs of those offsets. In both cases, we find that, to induce the optimal effort levels, the emissions need to be overallocated, even if the carbon tax is the true social cost of carbon. This is in contrast to the usual focus in the life-cycle assessment (LCA) and carbon footprinting literatures on avoiding double counting. Our work aims to lay the foundation for a framework to integrate the economics- and LCA-based perspectives on supply chain carbon footprinting.


While inventory- and revenue-management problems can be represented as Markov decision process (MDP) models, in some cases the well-known dynamic-programming curse of dimensionality makes it computationally prohibitive to solve them exactly. An alternative solution, called here the control-algorithm approach, is to use a math program (MP) to approximately represent the MDP and use its optimal solution to heuristically instantiate the parameters of the decision rules of a given set of control policies. As new information is observed over time, the control algorithm can incorporate it by re-solving the MP and revising the parameters of the decision rules with the newly obtained solution. The re-solving issue arises when one reflects on the consequences of this revision: Does the performance of the control algorithm really improve by revising its decision-rule instantiation with the solution of the re-solved MP, or should an appropriate modification of the prior solution be used? This paper analyzes the control-algorithm re-solving issue for a class of finite-horizon inventory- and revenue-management problems. It establishes sufficient conditions under which re-solving does not deteriorate the performance of a control algorithm, and it applies these results to control algorithms for network revenue management and multiproduct make-to-order production with lost sales and positive lead time.

A major benefit of flexible products is that they allow for supply-side substitution even after they have been sold. This helps improve capacity utilization and increase the overall revenue in a stochastic environment. As several authors have shown, flexible products can be incorporated into the well-known deterministic linear program (DLP) of revenue management’s capacity control. In this paper, we show that flexible products have an additional “value of flexibility” due to their supply-side substitution possibilities, which can be captured monetarily. However, the DLP-based approaches proposed so far fail to capture this value and, thus, steadily undervalue flexible products, resulting in lower overall revenues. To take the full potential of flexible products into account, we propose a new approach that systematically increases the revenues of flexible products when solving the DLP and performing capacity control. A mathematical function of variables available during the booking horizon represents this artificial markup and adapts dynamically to the current situation. We determine the functions parameters using a standard simulation-based optimization method. Numerical experiments show that the benefits of the new approach are biggest when low value demand arrives early. Revenues are improved by up to 5% in many settings.


As supply chains become increasingly complex and global in their scale, supplier selection and management in the face of disruption risk has become one of the most challenging tasks for modern managers. Several novel model-based approaches to managing such risks have been developed in the academic literature, but how behavioral tendencies may affect procurement decisions under such conditions has received relatively less attention. In this paper, we present results from a study where paid subjects were asked to place orders from two suppliers who differ in their costs and risks to satisfy a fixed amount of end-customer demand. We show that under such a scenario, it is theoretically optimal to sole source either from the more reliable (and more costly) supplier or from the more risky but cheaper supplier, depending on cost and risk parameters. Subjects in our experiment, however, show a systematic tendency to diversify their orders between the two sources. We document this diversification tendency in procurement decisions and its possible impact on profits under various cost and risk settings as well as comment on various ordering behavior observed during the experiments. We also establish that bounded rationality of subjects can provide a possible rationale for the above phenomenon.